The New England Water Quality Program: Agricultural Research to Action in Extension

The New England Water Program

The New England Water Program emerges from the combined research, education, and Extension strengths of New England's six Land Grant Universities and incorporates key partners into a framework for protecting water quality within the region's rural and agricultural watersheds. The New England Water Program has two agricultural focus areas: **Agricultural Nutrient and Pest Management** and **Animal Waste Management**.

New England's patchwork of colonial farms and historic villages lie within compact, rural watersheds that contribute to drinking water supplies and an abundance of fresh and coastal water resources that New England depends on for its economic stability and way of life. Nutrients, pesticides and pathogens from agricultural lands have impacted drinking water supplies, fin fishing and shellfishing waters. Close proximity to high population densities, a high cost of living and limited land base have prompted New England farmers to intensify production, as well as diversify and adopt innovative and alternative crops, markets, and practices that enhance both farm viability and environmental stewardship.

Research Highlights

Organic Forage and Grain Cropping Systems

A shift towards organic farming, particularly in the dairy industry, allows New England farmers to increase profitability on a limited land base by producing a value-added product. The production on-farm organic forage and grains have created opportunities for eliminating pesticide use, while posing challenges for nutrient and soil quality management. The use of organic nutrient sources, such as manure, can result in a build-up of soil phosphorus levels when applied to meet crop nitrogen needs. Mechanical weed control is a challenge for organic dairy farms.

There are over 200 organic dairy farms in New England. Maine has the largest percentage and Vermont has the largest number.

Winter spelt planted for on-farm organic grain, ME.

UVM conducts research on organic dairy farms.

UMaine and UVM have been researching organic forage and grain cropping systems that utilize alternative crops and cropping system ecology to minimize weed pressure, nutrient excess and impacts to soil quality. These systems are also being evaluated for their impacts on feed quality and quantity, milk production and overall cost-efficiency.

•Over the last two years, UMaine and UVM received a joint USDA Northeast SARE grant; and UMaine, UNH and USDA ARS received a joint USDA CSREES Integrated Organic Program grant totaling over $950,000 to continue this research.

•UNH is establishing the nation's first Land Grant organic dairy farm to serve as an applied research and education center for students and dairy farmers.

•UVM is a co-leader in developing an eOrganic Community of Practice for the internet-based eXtension.

•UMaine and UVM partner with organic farming associations throughout New England assisting with educational needs assessment and conducting regional training programs.

BMR sorghum-sudan being harvested for silage. Double-cropped with winter wheat, ME.

Proposed Upper Northeast Pasture Research Center for New England and Eastern New York

Proper pasture and grazing management is a sustainable farming practice that minimizes production costs and increases profitability while protecting and enhancing soil and water resources. Pesticide use and soil erosion are significantly reduced or eliminated, and pasture-based systems encourage a balance in livestock stocking rates, which reduces risks of generating excessive manure and nutrients. Emerging information about the nutritional benefits of grass-fed meat and milk products is also raising consumer awareness about pasture-based farming, providing new value-added markets for New England livestock producers to further increase profitability and sustainability.

Coordination efforts have resulted in:

•Regional stakeholder meetings attended by all New England states and New York.

•Development of an interim research proposal.

•Formation of a southern New England grazing network; six regional pasture walks were conducted in RI, CT, and MA during 2006.

•UMASS and a committee of farmers, government agencies, and non-profit organizations received an endorsement of a pre-proposal by The Northeast Pasture Research and Extension Consortium to establish an USDA ARS pasture-based research and learning center.

•The proposed research center will focus on the challenges posed by a short grazing season on a limited land base, as well as multi-species grazing and diversified small farm systems prevalent in New England.

Regional stakeholder meeting, UMASS Crops and Animals Research and Education Center.

Agricultural Nutrient and Pest Management

Focus Area Leader: John Jemison, UMaine Cooperative Extension Water Quality Program, Water Quality and Soil Specialist

Increases in organic and pasture-based agriculture have created new opportunities for eliminating pesticide use, as well as challenges for nutrient and soil quality management.

Animal Waste Management

Focus Area Leader: Stephen J. Herbert, UMASS Dept. Plant, Soil and Insect Sciences, Professor of Agronomy and team leader UMASS Extension Crops, Dairy, Livlivestock, Equine Team.

Economies of scale are forcing the livestock industry in New England to increase animal numbers and intensify manure applications to agricultural lands. Nutrient excess can also occur in manure as a result of feed management practices.

New England Land Grant University Extension and its collective partners are assisting farmers with research-based nutrient, manure and pest management programs, BMPs, resources, and technology that minimize agricultural impacts to ground and surface waters. Extension programs provide farmers, agricultural service providers and other partners with these resources through a variety of channels including: training programs, workshops, field days, farm tours, and web and print media. New England Extension also provides leadership and facilitation in developing new initiatives and programs that integrate emerging research and provide regional tools and resources.

Extension Education Highlights

The New England In-Service Training for Agricultural Service Providers Program

Agricultural service providers are a key link to the farming community. UMaine CE conducts an annual two-day regional collaborative training program that provides New England agricultural service providers with **Certified Crop Advisor (CCA)** recertification credits. The training presents emerging research and agricultural BMPs that protect and improve water quality and quantity. Extension educators and affiliates from various agencies and organizations present subject matter that is integrated across all CCA competency areas – nutrient, soil and water quality, crop and pest management.

•Over 100 Certified Crop Advisors have participated since 2000.

Program evaluations conducted during the February 2004 program indicate the following impacts. **Program participants:**

- •Influenced manure applications on at least 60,000 acres and soil fertility management on 55,000 acres.
- •Assisted 654 farmers with improved soil fertility management and 375 farmers with improved pest management.
- •Saved growers over $785,000 in production costs.

An updated program evaluation is planned for February 2007.

UMaine conducted a summer CCA field training program while hosting the USDA Northeast SARE Professional Development Program summer tour, July 2006.

•20 CCA's from New England and 60 Northeast SARE representatives participated.

Enhanced Infiltration for Animal Waste Treatment

URI is collaborating with UCONN Nonpoint Education for Municipal Officials and RI NRCS to adapt and examine low impact development bioretention filters for small acreage livestock properties. Treatment of leachate from composted manure and runoff from heavy use horse paddocks will be the initial focus.

The project is being funded by RI NRCS though a Conservation Innovation Grant and will be incorporated into the URI Small Acreage Livestock Education Program.

Farmer's Watershed Alliance

Local farmers and UVM Extension formed the Farmer's Watershed Alliance, a proactive approach to increasing farmer awareness and adoption of BMPs through self-evaluation, farmer to farmer networking and nutrient management plan development to reduce the impact of agriculture on water quality.

In February 2006, UVM developed and conducted a nutrient management course for farmers in partnership with Vermont NRCS.

•10 farmers planned a total of 7,779 acres (420 fields).

•100% of the farmers recommend the course to other farmers.

•50% of the farmers will apply less nitrogen and phosphorus.

Small Acreage Livestock Pollution Prevention

Throughout New England, small acreage livestock and horse owners often "slip through the cracks" for receiving education and assistance that encourages the adoption of livestock BMPs that protect water quality. Properties usually consist of small residential lots that are close to water resources causing problems with manure management and animal stocking rates. This target audience often has different goals, conditions and resources compared to commercial livestock farms.

In September 2006, URI CE received an USDA CSREES NIWQP grant to conduct a needs assessment and develop a train-the-trainer pollution prevention education program for small acreage livestock and horse owners.

•URI CE developed a fact sheet and self-assessment series for this target audience as part of the URI Healthy Landscapes Education Program. UNH CE and The New England Small Farm Institute have incorporated these resources into education programs.

•UMASS Extension conducts annual workshops on manure and pasture management for small acreage livestock and horse owners through the Mass Aggie Seminars Program. UMASS and URI are sharing program resources.

Research Highlights

Cover Crops and End-of-Season Nutrient Recovery

UMASS is conducting research on the role of cover crops in recovering end-of-season nutrient residuals in corn, including from fall-applied manure. Traditionally, cover crop seeding dates have been established for achieving effective soil erosion control. Research results indicate that existing cover crop planting dates are not effective in taking up end-of-season nitrogen (N); the risk of this N leaching to groundwater is high. This is especially problematic on dairy farms applying manure in the fall and represents a real economic cost in terms of nutrients lost.

•In 2006, UMASS received an USDA Northeast SARE grant to continue this research and develop a fall growing degree day model for cover crop varieties.

•Project includes on-farm trials and various methods and varieties for establishing cover crops.

•Research is presented at regional conferences, in-service trainings, and farm tours.

Smooth bromegrass inter-seeded in corn, MA.

Regional farm tours conducted, MA.

Feed Management

Economies of scale are forcing livestock producers to increase animal numbers, which often results in the use of purchased feeds and concentrates containing high levels of protein and other nutrients. This can result in manure containing excessive nitrogen (N) and phosphorus (P).

•UMASS has conducted an in-depth survey of feed and nutrient management practices with over 40 dairy farmers and collected manure samples for running the fecal P indicator test. The test was developed as part of northeast regional research project and indicates if P is being over-fed.

•UMASS has used the Cornell Net Carbohydrate and Protein System with livestock producers to predict requirements, feed utilization, animal performance and nutrient excretion. The goal is to optimize feed composition and strategies to meet animal requirements and minimize excessive nutrient excretion.

Feed management recommendations will be summarized and shared with the region through Extension education activities.

Manure Field Stacks

UCONN is conducting research on reducing nutrient loss from manure field stacks by covering the stacks with organic materials such as compost, leaves, straw or wood chips, and/or by placing the stacks on the same organic materials.

The research included on-farm trials and collaboration with the New England Small Farm Institute and is supported by USDA Northeast SARE and USDA NRCS.

Research results will be adapted by the URI Small Acreage Livestock Education Program.

Nutrient Management

UCONN and UMASS research nutrient testing methods such as end-of-season corn stalk tests to develop and refine performance based nutrient management plans with USDA NRCS CT, MA, and RI.

UCONN has developed nutrient management plans for over 9,500 acres in CT, collecting nutrient data and establishing baselines for each farm.

•UCONN is studying farmer implementation of nutrient management plans to track behavior change and factors affecting management.

New England Water Program Agricultural Focus Area Members, www.usawaterquality.org/newengland

Holly K. Burdett[1], John Jemison[2], Stephen J. Herbert[3], Heather Darby[4], Thomas Morris[5], Roy Jeffrey[5], Arthur J. Gold[1]

[1]University of Rhode Island, College of the Environment and Life Sciences/Cooperative Extension, [2]University of Maine Cooperative Extension, [3]University of Massachusetts, College of Natural Resources and the Environment/UMASS Extension, [4]University of Vermont Extension, [5]University of Connecticut, College of Agriculture and Natural Resources/Cooperative Extension System.

This material is based upon work supported in-part by the Cooperative State Research, Education, and Extension Service, U.S. Department of Agriculture, under Agreement No. 2004-51130-03108. This is contribution number 5073 of the College of Environment and Life Sciences, University of Rhode Island.